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Item 7 of the provisional agenda*

ECONOMIC COMMISSION FOR AFRICA

Twenty-second session of the Commission/ thirteenth meeting of the Conference of Ministers

Addis Ababa, Ethiopia
23 - 27 April 1987

Item 6 of the provisional agenda**

LG/NAIROBI

REPORT OF THE REGIONAL MEETING ON SOCIO-ECONOMIC AND POLICY ASPECTS OF WATER RESOURCES MANAGEMENT IN AFRICA

* E/ECA/TPCW.8/1.
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1. The Regional Meeting on Socio-Economic and Policy Aspects of Water Resources Management in Africa was organized jointly by the secretariat of the Economic Commission for Africa (ECA) and the United Nations Educational, Scientific and Cultural Organization (UNESCO). It was held in Addis Ababa, Ethiopia, from 2 to 6 June 1986.

ATTENDANCE

2. The meeting was attended by representatives from the following member States: Benin, Burundi, the Congo, Côte d'Ivoire, Egypt, Ethiopia, the Gambia, Ghana, Guinea, Guinea-Bissau, Mauritania, the Niger, Nigeria, Senegal, Sierra Leone, Uganda, the United Republic of Tanzania and Zambia. Representatives from the following United Nations organizations also attended: Department of International Economic and Social Affairs (DIESA), United Nations Centre for Human Settlements (HABITAT), the United Nations Development Programme (UNDP), United Nations Children's Fund (UNICEF), United Nations Environment Programme (UNEP), United Nations International Research and Training Institute for the Advancement of Women (INSTRAW), United Nations Sudano-Sahelian Office (UNSO), International Labour Organisation (ILO), Food and Agriculture Organization of the United Nations (FAO), World Meteorological Organization (WMO) and the World Bank.

OPENING OF THE MEETING

3. The meeting was opened by Mr. Tchouta Moussa, Deputy Executive Secretary of the Economic Commission for Africa. In the course of his opening address, he welcomed the participants on behalf of the Executive Secretary, Professor Adebayo Adedeji. He emphasized the importance of the meeting in the light of the call for accelerated action in water resources development by the United Nations Water Conference nearly 10 years ago, later endorsed by the Lagos Plan of Action, and of the call for achievement of the goals of International Drinking Water Supply and Sanitation Decade launched by the General Assembly in 1980. Despite the efforts being made by African Governments and external support agencies, so many of the severe problems affecting the African region had eroded the progress being made and pushed the achievement of the goals and targets a little further away every day. In drawing attention to Africa's Priority Programme for Economic Recovery, 1986-1990 (APPER) which was presented to the special session of the General Assembly on the Critical Economic Situation in Africa, he indicated the importance of water resources development and management in its implementation and the need to use the Priority Programme as a framework for the deliberations of the meeting.

4. Mr. Awad Idris, UNESCO representative to Ethiopia and Liaison Officer to ECA and OAU, welcomed the participants to the meeting on behalf of the Director-General of UNESCO, Mr. Amadou M. M'bow. He reiterated the role water resources development played in enhancing the socio-economic progress of the African people and the importance of the meeting in providing solutions to the problems confronting the region.

ELECTION OF OFFICERS

5. The following officers were elected unanimously: Chairman, Mr. Melesse Endalamaw (Ethiopia); Vice-Chairman, Mr. Mustapha Kane (Mauritania); and Rapporteur, Mrs. Toks Ogbe (Nigeria). Mr. Vincent P. Lokrou (Côte d'Ivoire),

Dr. Aklomeno Oteri (Nigeria), Mr. Mustapha Kane (Mauritania) and Dr. Shafika Nasser (Egypt) were elected as Chairpersons for working groups A, B, C and D respectively. Mr. Nii Boi Ayibotele (Ghana), Dr. E.O. Arthur Gilpin (Sierra Leone), Mr. Jubril A. Hanidu (Nigeria), and Mr. John Pickford (the United Kingdom) acted as resource persons for each of the working groups respectively.

ADOPTION OF THE AGENDA AND ORGANIZATION OF WORK

6. The participants adopted the following agenda:

1. Opening of the meeting.
2. Election of officers.
3. Adoption of the agenda and organization of work.
4. Statements by the organizing agencies.
5. Keynote speeches.
6. Country papers.
7. Statements by United Nations organizations and agencies.
8. Discussion of issues concerning;
   (a) Planning and management of water resources and their assessment;
   (b) Education, training and research;
   (c) The role of water resources in national socio-economic development;
   (d) Environmental and health aspects.
9. Future regional co-operation activities.
10. Consideration of draft report.
11. Consideration of draft recommendations to be included in the final report.
12. Closure of the meeting.

7. Each of the major topics under agenda item 8 was discussed in a working group, which later presented its recommendations to the meeting.

Statements by the organizing agencies (agenda item 4)

8. A representative of the ECA secretariat drew the attention of participants to the status of water resources development in Africa, in the light of the social and economic crisis in Africa which had largely negated the progress made since 1977 in the implementation of the Mar del Plata Action Plan.

9. Nevertheless, in the light of the resolve by African Governments to implement the programme for economic recovery, it was the task of the meeting to identify for national economic planners the priority areas for action in the field of water resources development.

10. In formulating its recommendations, the working groups should give emphasis to measures to be implemented by African Governments themselves and to the means of generating their own internal financial and human resources.

11. The UNESCO Regional Hydrologist for Africa emphasized the importance of water resources management, and the development of joint, economically viable water projects between countries sharing common waters, aimed at a sustainable growth of the economy of the subregions of Africa. He drew attention to the need for the development of the necessary human resources in water legislation and research, and to the need for joint economic interlinking of projects related to water resources. He called for increased regional co-operation among the countries themselves, as well as by the organizations of the United Nations system and other regional and bilateral organizations. He further recommended the establishment of the African Network Centre for water resources studies, research and development in Africa; that type of meeting should be considered as a continuous educational process which should be held every two or three years, treating other related topics, assessing progress made on previous recommendations, and endeavouring to reach as many people as possible.

12. Dr. Shafika Nasser (Egypt) addressed the participants on behalf of the Director of the United Nations International Research and Training Institute for the Advancement of Women (INSTRAW), Ms. Dunja Pastizzi-Ferencic. She expressed her confidence that the meeting would contribute towards a better understanding of the socio-economic and policy aspects of water resources management and, in doing so, seek ways to enhance the role of women in water supply and sanitation. She recalled the mandates given to governments and to the international community alike through the Forward-Looking Strategies adopted by the World Conference to Review and Appraise the Achievements of the United Nations Decade for Women: Equality, Development and Peace, in July 1985, to change the perspective of development for the betterment of society, by enhancing the role of women in socio-economic development. In that respect, she noted that the role of women as agents in the planning, implementation and administration of drinking water supply and sanitation had been underscored by the Conference.

Keynote speeches (agenda item 5)

13. A keynote speaker addressed the meeting on each of the main topics to be considered under agenda item 8 as a means of providing a framework for the ensuing discussions (a summary of those speeches is provided below).

(a) Planning and management of water resources and their assessment

14. This paper was presented by Mr. Nii Boi Ayibotele (Ghana).

15. The paper drew attention to the social, economic, political and climatic conditions in which the Mar del Plata Action Plan had been implemented in the African region. It recalled the recommendations of the African Regional Preparatory Meeting and the United Nations Water Conference in respect of national water policy, institutional management, legislation and public participation. It then reviewed the progress and constraints in the implementation of the recommendations. It concluded that though there had been a few achievements, the region on the whole had not fared well. It

noted that the constraints of manpower, finance and know-how were still much with this region as they were in 1977. It suggested that those constraints be looked at in the totality of the constraints in the national economies. In that regard, attention must also be paid to the state of the global economy, so that realistic targets might be set. Institutional and legislative arrangements should be kept constantly under review, so that new institutions might be etablished and new laws enacted in response to changing needs. On water resources assessment, it was suggested that co-ordination should be effected at the national, subregional and regional levels. The primary responsibility lay at the national level, where the initiations must start. It was also recommended that countries that had not already done so should apply the UNESCO/WMO guidelines to evaluate their national water resources assessment activities.

(b) Training and research for water supply development in Africa

16. This paper was presented by Dr. E. O. Arthur Gilpin (Sierra Leone) on behalf of Dr. Eustace Gondwe (the United Republic of Tanzania).

17. African countries had set their respective target dates to supply their people with safe water according to the International Drinking Water Supply and Sanitation Decade (IDWSSD). Few African countries would be able to supply all their people with safe water before the year 2000. The original target set by the IDWSSD will not be fulfilled because of inadequate funds and trained manpower for the water supply and sanitation programmes.

18. The sophistication of many water supply schemes dictated the level of competence of manpower that was required for both urban and rural water supply programmes. Two types of training were required.

19. The first type had to do with the training of engineers practising in the field. Such training would be acquired from experience. The engineers or technicians would have been trained as civil engineers under an undergraduate or post-graduate curriculum in a university or a polytechnic. Occasionally, the university-trained water specialists were not prepared to work in the rural areas and ended up working in urban programmes.

20. Under the second type of training, water technicians were trained in middle-level institutions for periods ranging from one to three years. Minimum requirements for acceptance for training was ordinary level certificate. Such technicians did not spend all their training period in design offices but were trained mainly to maintain the water systems. They were trained by engineers and they developed the attitudes of engineers and ended up trying to become engineers. Thus, they did not appreciate the pride in being good technicians.

21. Pump attendants and plumbers, who were required for rural water supply programmes, should be trained in the villages and should come from the populations of the villages and should be trained for only short periods by visiting technicians or engineers. Because of the inadequate period of training, African countries spent huge funds to rehabilitate water supply schemes which had deteriorated under the responsibility of those artisans.

22. Research into relevant procedures for water supply programmes in Africa was very necessary. The quantity and quality of water resources in Africa

must be established before exploitation. Appropriate technologies had to be developed because parameters used in designs were those from developed countries with different climatic and environmental conditions. Therefore, Africa must establish its own design parameters.

23. Theoretical and applied research were urgently required for the proper development and improvement of water supply schemes. Theoretical research in universities helped practical application and such research could now be carried out speedily by computers. All African countries, therefore, should gear their work to new innovations in the technology of water supply.

24. Applied research could be carried out by practising engineers and water scientists at their places of work because of readily available data. Those engineers could obtain water consumption per capita and could also evaluate the quality of potential water resources in order to maintain required standards. They could investigate the effects of the quality of water on the health of the people. Most African countries already had over 20 years' data to carry out research on the technology of water supply schemes. The technology should be of reasonable cost and should depend on the availability of energy sources.

25. The presentation of the paper was supplemented by a description of INSTRAW's current programme on training. The representative of INSTRAW described how two prototype training modules had been prepared at the ILO/Turin Training Centre on Women, Water Supply and Sanitation.

26. One of those modules was later shown to the meeting and comments on it were invited from participants.

(c) The role of water resources in national socio-economic development

27. This paper was presented by Mrs. Toks Ogbe (Nigeria), on behalf of Mr. J.O. Sonuga (Nigeria).

28. Water played important roles in enhancing the standards of living and in ensuring more tolerable conditions of existence. It influenced the economic conditions of the country. Certain constraints including manpower shortages, the lack of adequate funds, a low level of technological development and natural causes had not allowed the realization of the full import of water resources development in the developing countries of Africa.

29. Water resources, if properly planned and implemented, would bring about massive socio-economic changes which could make the countries self-sufficient in food production (especially through irrigation schemes) and achieve self-sustaining economic growth.

30. Water resources development, therefore, required careful attention to provide full socio-economic benefits. The river basin approach was advocated along with preparation of basin-wide master plans based on simulation models, which were to be strictly adhered to at all phases of implementation. An established institutional organization should be responsible for the overall development (planning, implementation and management) related to water and land within the river basin. Effective co-operation among countries sharing a major basin was very essential. Long-term measures to combat the economic crises and natural disasters affecting the African countries certainly involved

adequate water resources development in the affected areas. In view of human suffering, water resources development (including inter-basin transfers) should be evaluated not only on the basis of cost-effectiveness but also the other sociological factors, some of which were difficult to quantify.

(d) Environmental and health aspects

31. This paper was presented by Professor John Pickford (the United Kingdom).

32. Drinking water sources located far from habitation, brought a terrible burden to women and others. Polluted water, even in abundance, could be a danger to life and bring immense misery due to disease. In Africa bilharzia, Guinea worm, diarrhoea and intestinal worms were common, especially in rural areas and underprivileged urban communities. Guinea worm disease could be eradicated by fairly simple and inexpensive measures, and the incidence of roundworm and hookworm (which waste scarce food) could be drastically reduced by adequate sanitation. Drinking water quality should conform to the new WHO guidelines which were appropriate for small communities in developing countries.

33. Appropriate technology (especially hand-pumps and pit latrines) and community participation (especially at the planning stage) were stressed; both should be related to operation and maintenance, and institutions capable of financing works should be strengthened.

34. Apart from safe water and adequate excreta disposal, important environmental management measures required in Africa were collection and disposal of solid wastes, disposal of domestic waste water and control of industrial effluent discharges. Consideration should always be given to potential advantages of undertaking many small projects rather than a few large ones.

Country papers (agenda item 6)

35. Representatives of countries described the efforts made in their countries to implement the Mar del Plata Action Plan and to attain the goals of the International Drinking Water Supply and Sanitation Decade. They outlined the progress made nearly 10 years after the United Nations Water Conference and the constraints faced in the accelerating water resources development activities. Many countries informed the meeting that, despite the efforts made, there had not been any significant progress in the sector as a whole.

36. Some of the major reasons hampering or retarding progress were the prevailing economic conditions, low performance of the production sector, high interest rates, high debt servicing, high population growth rates, instability and the devastating effects of drought.

37. It was stated that many governments had taken steps to strengthen or rearrange their institutional frameworks. In many cases, the steps taken were not adequate since they did not accommodate the multi-dimensional aspects of the sector. Concerning policy issues, in a large majority of countries policies had been elaborated, priorities established and national water plans and programmes formulated as an integral part of the development process. Some countries, however, had also reported that responsibilities for water development rested within the ambits of many organizations and the problems

of proliferation of authority and lack of co-ordination constituted a serious constraint. Some representatives stated that, in their countries, water resources development had regressed to a deplorable level. They informed the meeting that very basic issues such as institutional aspects, policy and planning were in a worse situation than when the United Nations Water Conference had been held. For example, the networks of hydrometeorological stations had fallen apart and much needed to be done for any progress to be made.

38. While a number of countries reported that they were in the process of preparing water legislation, in many instances it was not comprehensive. Many countries lacked water legislation and, even where it existed, it was fragmented, inadequate and did not cover all sectors of water resources development.

39. The meeting noted that there was lack of basic water resources data both for planning and development purposes. It was reported that the quantity of surface-water resources was better known than its quality. In the area of ground-water resources assessment, there had not been any significant progress. Activities in that area were often limited to drilling of boreholes for drinking water supply. In view of the indispensability of basic data for water resources development, the participants called attention to the urgent need to conduct assessments of surface and ground water, in terms of both quality and quantity.

40. Community participation and mass education were reported to be receiving increasing attention. The main areas of focus were drinking water supply and sanitation and the promotion of primary health care.

41. It was stated that many countries were making efforts to promote development-related research, suitable for their economic and social environments. Some of the major constraints were the lack of adequately trained, high-level manpower and finance. Further, the need for co-ordination of research activities within the region was considered vital to optimize efforts, to avoid duplication, to minimize the waste of resources and to promote the exchange of knowledge and experience.

42. Many representatives elaborated on the environmental degradation arising from deforestation, overgrazing and soil erosion, culminating in the recent drought that took many lives and disturbed the whole ecosystem. It was noted that efforts were being made to restore an ecological equilibrium through the launching of land and water management programmes.

43. The meeting was informed about the problems of pollution arising from industrial waste disposal. Insufficient action had been taken up until then because of the lack of legislation.

44. It was reported that considerable efforts in the area of drinking water supply and sanitation were being made. Despite those efforts however, progress made fell far short of the targets of the International Drinking Water Supply and Sanitation Decade. In that context, attention given to sanitation was quite insignificant compared to drinking water supply.

45. In the presentations, it was reported that many countries were making efforts in the area of regional and subregional co-operation over their shared

water resources. In that regard, a participant indicated a desire to take preliminary steps towards establishing an intergovernmental committee for the Nile Basin. Such a committee could assist in the formulation of water regulations for the assessment, prevention, protection and control of the Nile waters.

46. Representatives informed the meeting that efforts were also being made in the areas of agricultural water use, hydro-power generation, industrial water use and navigation. Those efforts had often been limited by a number of constraints. From the discussion, it was noted that, depending on the status of economic development of the countries and the priorities attributed to the water sector, the degree of achievement might vary but the general trend indicated that the implementation of the Mar del Plata Action Plan had not advanced satisfactorily.

47. Some of the constraints encountered, in addition to the major economic, political and natural calamities referred to previously, were the following:

(a) Lack of finance was a major common problem affecting all economic sectors;

(b) Manpower at all levels, and particularly at the management level, stood out as a constraint in the large majority of countries;

(c) Other problems related to institutional weaknesses, absence or inadequacy of water legislation; high investment costs, problems of cost recovery in water supply projects, inadequate maintenance facilities, lack of continuity in plans and programmes and lack of training facilities.

Statements by United Nations organizations and agencies (agenda item 7)

48. The secretariat of the Economic Commission for Africa as well as representatives of the various organizations of the United Nations system attending the meeting made brief presentations of their activities as they related to the African region.

49. A representative of the UNDP/World Bank Global Hand-pump Project later described some of the aspects of the work being carried out in Africa.

Recommendations from the working groups as adopted by the meeting (agenda item 8)

(a) Planning and management of water resources and their assessment

1. Planning

50. One of the constraints which had affected effective implementation of the Action Plan with respect to planning had been a lack of effective links or integration of the water resources sector plans with national economic development plans. While a number of countries reported progress with the preparation of master water plans or perspective plans, such plans had not been linked up properly with medium-term development plans. It was recommended that this constraint be covered by using priorities set by the national economic planning goals and targets.

51. The unavailability of suitable human and financial resources was identified again as one of the major constraints.

52. National planning seemd ineffective because the multidisciplinary and inter-agency approach for effective formulation of plans had not been followed. National governments were urged to pay attention to it and address that shortcoming in their planning processes. The planning teams must be composed of experienced professionals. It was to be noted that the experience and capability of such teams would increase the ability of the countries to absorb external assistance.

53. One of the key constraints identified was financial. This had been so because realistic pricing policies had not been followed, so that costs of investments in water projects could not be recovered. It should be pointed out that water was not a free commodity, and that if the question of cost recovery was not urgently addressed, the trends were that the national economies would not be able to bear the cost of new developments or maintenance in the following two to four years. To avoid that crisis, water tariffs should be applied which would enable costs to be recovered for new developments.

54. In addition to that, other internal financial resources must be mobilized. The rural sector should receive special attention in that regard to find innovative solutions. Those solutions should be supported with the appropriate institutional and legal arrangements. It was recommended that the participation of rural communities and the use of appropriate technologies that reduced foreign exchange components of water projects would greatly help in that direction.

55. In order to make use of limited financial resources, projects should be monitored as they were implemented to ensure proper accountability.

56. Other constraints identified with national policies and planning related to a lack of commitment by governments to adhere to plans, a lack of continuity in planning and implementing projects and in their evaluation. It was recommended, therefore, that the attention of governments be drawn to the fact that social and economic benefits that accrued from water resources development could not be attained unless they showed political will to commit themselves to plans, and give professionals the freedom that should be given to them to ensure that approved plans were implemented.

57. Another constraint identified was the weakness of the data bases of the national economic and water sector plans. It was recommended that for the plans to be realistic and to reflect the true national situation, the capabilities of the various agencies and organizations responsible for data collection and monitoring be considerably improved. In that regard, the case of the International Drinking Water Supply and Sanitation Decade needed special attention. The international organizations could be required to assist in that.

58. It was noted that there was need to sensitize the international and bilateral organizations to the plans and priorities of the countries of the region, and a dialogue between governments and the organizations was necessary.

59. It was recommended, therefore, that the current consultations between the national governments, UNDP, the World Bank and other bilateral and multilateral agencies aimed at resolving, planning, financing, implementing, monitoring and evaluating issues be strengthened and continued.

2. Institutional arrangements

60. Two types of institutional arrangements existed in the countries. There were countries with centralized institutions with responsibility and control of all aspects of water resources planning and management under them. In such cases, co-ordination of planning and management activities presented few difficulties. What was a problem was the linkage with the national economic plan, which had already been mentioned. The second case was with countries which had different institutions to deal with different types of water use. In that case, co-ordination of the water sector was a problem, and it was recommended that an effective co-ordinating institution be established. Secondly, they also had the task of linking with the national economic plans. It was noted that, in the case of shared water resources, though institutions had been established they were weak because they had not been supported with adequate financial and human resources. In view of the fact that those institutions were meant to deal with common socio-economic development issues of importance to the countries involved, every effort should be made to strengthen them with adequate funds and manpower. This was equally applicable to the various national institutions.

61. In general, countries should keep their institutions under constant review and establish new ones or amend existing ones in response to changing needs.

62. Attention was drawn to the operations of the international organizations at the subregional and regional levels. It was noted that they had not always been well defined and that, to be very effective their efforts needed to be co-ordinated. The role of the UNDP Resident Representative in that regard was crucial.

3. Legislation

63. It was noted that legislation had a direct link with the institutional arrangements. Two types of legislation could were involved: that dealing with water resources at the national level; and that dealing with internationally-shared water resources.

64. At the national level, whether the legislation covered the activities of centralized water institutions or of several institutions, it addressed the question of rational, effective and equitable water allocation and water protection. Reasonable water tariff legislation in support of the provision and distribution of water should be promulgated, effectively supported and implemented. It was recommended that, since data on ground water development and use and on water quality were particularly lacking, special legislation should be enacted to ensure that such data was collected and reported to a central body.

65. It was also recommended that national legislation be such that it was implementable and did not just remain on the statute books.

66. In the case of internationally-shared water resources, including ground water, a number of protocols and conventions existed. Though they had been prepared for various common river and lake basins, they were often weak and ineffective. It was recommended that, in view of the common socio-economic benefits those conventions and protocols were intended to bring to the countries concerned, every effort should be made to reactivate them. For countries which did not have such conventions and protocols, they should endeavour at the appropriate time to work out similar conventions.

4. Public participation

67. One of the constraints was lack of an awareness or appreciation of what public participation involved in its entirety. There had been the tendency to limit public participation to the rural areas. It was to be re-emphasized that it applied to the whole range from policy-making, planning, implementation and monitoring to evaluation. All the actors needed to be sensitized or made aware of that fact.

68. Women's involvement in public participation should be promoted, in particular, in view of their significant role in water collection and use, as well as in food crop production.

69. It had been the practice to plan from the top downwards. This did not make for good participation. Planning, project implementation and maintenance from the bottom upwards should be encouraged and there should be feedback or exchange of ideas between the top and the bottom. It was also noted that public participation had the great advantage of enabling appropriate technologies from the point of view of cost, operation and maintenance to be selected. It was to be noted that, if the right exchange of views between the planners and beneficiaries was achieved, costly and inappropriate choices would be avoided.

70. Public participation was not an easy concept to implement. Its realization required strong institutional support. For instance, for small-scale irrigation schemes, various arrangements like credit facilities, extension services and marketing were needed.

5. Assessment of water resources

71. This was one of the prerequisites for successful planning. The problems identified in 1976 were still present.

72. The constraints were, first, lack of co-ordination and repetition of work at the national, subregional and regional levels; and secondly, lack of resources, particularly of manpower and finance, which frustrated the implementation of recommendations of the Action Plan.

73. There were inadequate networks of stations for monitoring the quantity and quality of surface and ground water and sediment transport. Even the networks which existed in 1977 had since deteriorated in a number of countries. Poor data collection from existing networks, processing and dissemination of data, and the lack of data banks were common problems. Water balance elements had not been regionalized in many cases. Planning and design parameters had not been organized and analysed.

74. It was recommended that corrective measures be taken and that the efforts of all institutions involved in water resources assessment be co-ordinated at the national level. Secondly, countries were strongly urged to consider using the UNESCO/WMO guidelines for evaluation of water resources assessment activities. It was believed that this would reveal the national shortcomings in all aspects of assessment activities, and consequently show the way to improve the situation with or without external assistance.

75. A number of international organizations were involved in giving assistance to assess water resources at the subregional and regional levels. For such assistance to be effective their efforts needed to be co-ordinated. ECA, UNESCO and WMO should take the leadership in such effort.

(b) Education, training and research

1. Human resources

76. The participants recognized the lack of human resources as a major constraint in water resources management. It was recommended, therefore, that each country should assess those resources by publishing an inventory of national water engineers, scientists, technicians and other relevant experts.

2. Education and training needs

77. Within Africa, it was acknowledged that there were insufficient numbers of trained water resources personnel and that many were under-utilized. The national bodies responsible for water resources management should, therefore, implement a variety of new measures:

(a) Educational and training requirements should be assessed and plans drawn up;

(b) African universities and polytechnics should include management, planning, water engineering and water-related courses at both undergraduate and post-graduate levels;

(c) Foreign institutions and international agencies should help strengthen the water resources training facilities in these universities and polytechnics;

(d) There was a need for improved and extended middle-level human resources training; where necessary, new regional training centres should be established;

(e) Women, who hitherto had not been adequately catered for, should have access to training at many different levels covering the planning, implementation and maintenance of water resources projects;

(f) In-service training through workshops, seminars and short courses should be encouraged at all levels;

(g) The special skills of trained human resources should be fully utilized. There should be flexibility in training and appropriate incentives provided after training, in order to keep trained personnel in areas where their expertise would be needed;

(h) Specialized training or refresher courses should be provided periodically for researchers, managers and planners in water resources in order to update and refresh their skills.

3. Research needs

78. Not enough research was being carried out by institutions in African countries. It was recommended, therefore, that:

(a) Research units should be established in the African water resources organizations;

(b) Such units should work in collaboration with universities and other institutions;

(c) A network of African centres for water resources studies, research and development should be set up with international assistance and collaboration to encourage bilateral and regional co-operation;

(d) Deliberate efforts should be made to develop and utilize indigenous consultants in water resources projects in Africa;

(e) Information on research activities and findings should be stored, published and widely distributed as, for example, through UNESCO AFRIWATER:

(f) Research should be promoted and carried out in the following areas of common interest to the African region:

(i) Climate variability and its effects on hydrology and water resources;

(ii) Water resources assessment (particularly in the case of internationally-shared water resources basins);

(iii) Watershed management in the fight against land degradation (from overgrazing, inappropriate farming systems, bush fires and deforestation);

(iv) The use of appropriate technologies in the utilization and conservation of water resources;

(v) The exploration, exploitation and management of ground-water in the basement complex of the African region.

4. Development of appropriate technology

79. Technological developments should take into account the resource base, the environment, production activities, financial constraints and operation and maintenance factors. The rapid development of the hand-pump in Africa in recent years was strongly commended. The following recommendations were also put forward:

(a) Standardization of equipment with availability of spare parts;

(b) Encouraging where possible, the local production or manufacture of equipment, machinery and spare parts;

(c) Regular maintenance of equipment by the users;

(d) Training of women to operate and maintain such equipment;

(e) Investigation of the use of other technologies such as solar energy and wind power in suitable areas.

5. Public information and extension

80. There was a need for greater dissemination of information to the public in general, and the rural communities in particular, on all phases of water resources projects. It could be done through the INSTRAW/ILO/Turin Centre mulimedia modules, health education in schools, the mass media and special water weeks involving public demonstration.

(c) The role of water resources in national socio-economic development

81. The importance of water resources in the socio-economic development of countries was well known. It had been emphasized in the Lagos Plan of Action, the OAU programmes, Africa's Priority Programme for Economic Recovery, 1986-1990 (APPER) and in the United Nations Programme of Action for African Economic Recovery and Development, 1986-1990 (UN-PAAERD), where its role in food production and combating drought and desertification was highlighted.

82. In view of the paramount importance of water resources to all socio-economic activities, countries needed to establish a set of balanced priorities for the development and optimal use of available resources. The following considerations should receive attention:

(a) Development programmes should be rationalized to cater adequately for all sectoral demands;

(b) Water resources programmes must identify all possible users and ensure complete co-ordination between the institutions involved in the various sectoral elements to optimize benefits;

(c) Individual national considerations should determine priority water resources allocations;

(d) In determining these priorities, social benefits should have equal consideration with economic factors in project formulation, and an attempt must be made to quantify social benefits in the feasibility analysis of project proposals;

(e) Women's role in agricultural production must be recognized; similarly, they must be encouraged to participate at all stages of planning, execution and operation;

(f) Technology transfer was extremely important, and was one of the methods put forward to ensure the effective implementation of the Action Plan. The standardization of plant and equipment, in order to reduce operation and maintenance costs, was of critical importance. Although multilateral procurement practices aided standardization, bilateral agency methods often did not do so, since loans continued to be tied, despite the recommendation of 1977. It was recommended, therefore, that lending agencies liberalize their terms of lending in order to promote standardization and minimize costs to the country concerned.

1. Agricultural water use

83. The meeting put forward the following groups of recommendations with regard to agricultural water use:

(a) In formulating irrigation projects, attention must be given to the production of staple food crops as well as cash crops;

(b) There should be a balance between small-, medium- and large-scale irrigation schemes;

(c) It was essential to modernize African agriculture. It was no longer possible for rural communities to feed the increasing populations by traditional means, involving the use of customary tools and low productivity methods. Appropriate technology must be introduced, aimed at easing the drudgery in peasant agriculture and at increasing the area under cultivation in order to increase production, and at inducing young people in urban areas to return to agriculture;

(d) In future, countries ought to ensure that project analysis should contain the following elements:

(i) An evaluation of the data base and of relevant technical and socio-economic information;

(ii) Social cost-benefit analyses;

(iii) The population supporting capacity of the proposal;

(iv) A comparative analysis of national socio-economic policy;

(v) Environmental impact, particularly in terms of health and food security;

(e) All countries were urged to aim at the formulation of a national strategy in which they should:

(i) Assess the potential for irrigated agriculture with special reference to its short-, medium- and long-term role;

(ii) Within the national framework, establish the appropriate priorities in the selection of irrigated areas;

(iii) Establish national irrigation investment schemes;

(iv) Prepare guidelines for the promotion and support of small-scale irrigation projects and of self-help initiatives;

(v) Establish and strengthen those institutions responsible for the implementation of development policies;

(vi) Allow all farmers, both men and women, equitable access to agricultural credit schemes;

(vii) Provide incentives for increased production, including, where appropriate, pricing and marketing stimulants;

(viii) Develop adequate market structures;

(f) A strong appeal should be lodged with donor agencies to increase their support for development projects as opposed to emergency food aid;

(g) In view of the fact that health problems in rural areas of Africa, such as endemic vector-borne diseases could be associated with the development of irrigated agriculture and that good water management practices were a prerequisite to adequate environmental protection and vector control measures in irrigation, it was recommended that special programmes be developed aiming at:

(i) Educating and training users and extension workers in the use of proper protection techniques;

(ii) Increasing the awareness of policy-makers and managers;

(iii) Developing relevant research activities;

(h) In view of the scarcity of water resources and the need to use them efficiently, the reuse of effluents for irrigation should be considered, provided that potential health hazards and ground water contamination was avoided.

2. Community water supply

84. The following recommendations were adopted concerning this subject:

(a) The adequate provision of safe drinking water to both rural, urban and peri-urban population was essential. When different bodies were responsible for different groups of consumers, their activities must be co-ordinated;

(b) The urgent need for progress in this sector meant that it was essential that irrigation plans included potable water supply and the education components to ensure its safe utilization. Furthermore, the energy needs of water supply in towns and larger rural centres should be included in electrification plans;

(c) Funds commensurate with the importance of developing water resources were not allocated by governments because of a shortage of funds within national economies caused largely by the national debt burden. Such debts might have yielded a better return if invested in the water sector. Countries should review their borrowing policies in order to ascertain possible adjustments which would liberate funds to the water sector.

3. Multi-purpose development of water resources

85. The meeting agreed that the development of multi-purpose projects needed emphasis, particularly with reference to hydroelectric and inland navigation schemes. Socio-economic feasibility was often increased by inter-country and regional co-operation; subregional and regional approaches should also be considered.

4. Water quality

86. The meeting considered that water legislation to protect water quality was essential. Therefore Governments should institute procedures for the continuous monitoring of water pollution from industrial users; that should include thermal pollution and the contamination of ground water by the dumping of industrial wastes.

5. Disaster preparedness

87. With regard to floods and droughts, it was agreed that:

(a) Countries should accelerate or establish early warning system capabilities in reference to floods and drought;

(b) Inter-basin transfers, either at national or subregional level, could provide a means of combating drought and desertification and, therefore, political and socio-economic feasibility studies for such transfers should be undertaken;

(c) Governments should set aside the financial resources to establish and strengthen the various relevant data-collecting networks and to enable necessary research on climatic variations in relation to flood and drought occurrence to be carried out. The efforts of the international organizations and bilateral agencies were recognized but the various countries must make their own contributions and ensure that basic infrastructures were in place and adequate;

(d) In view of the close links between drought, floods, desertification and the degradation of environment by the destruction of vegetation, it was recommended that greater emphasis be laid on watershed management and the restoration of the vegetal cover as a means to combat such phenomena;

(e) Finally, member nations were called upon to draw up national action plans against drought and desertification in line with the Regional Plan of Action to Combat the Impacts of Drought in Africa, adopted in resolution 599 (XX) of the ECA Conference of Ministers.

(d) Environmental and health aspects

88. In order to combat the high incidence of diseases associated with poor water supply and sanitation, governments who had not already done so should require departments concerned with primary health care to urgently draw up lists of communities to be provided with safe water and adequate sanitation. Those lists should give priority to communities which appeared to have the highest incidence of schistosomiasis, Guinea worm disease and intestinal parasites (especially roundworm and hookworm). Account should also be taken of communities with high infant mortality rates and those with high incidence of infantile diarrhoea. Rural areas and deprived urban communities, especially squatters and those occupying substandard housing, should be given preference. Preparation of priority lists should not be delayed because of lack of detailed statistics, but should be carried out with the greatest possible speed using any available evidence.

89. Governments should use their own resources and the facilities of women's groups, voluntary and community associations (including churches and other

religious groups), the public media and all other means to intensify education programmes that explain the benefits of good water supply and sanitation. In addition, the programmes should point out the association of disease and infant death with the following:

(a) Poor quality drinking water;

(b) Inadequate quantity of water for personal and household use;

(c) Defection in or near water, on open spaces or in poorly constructed and badly maintained latrines; and

(d) Indiscriminate disposal of faeces and household wastes.

90. Education programmes should encourage:

(a) The formation, support and training of local committees, which should normally include a majority of women members, to plan and promote improvements to water supply and sanitation;

(b) The provision by householders and communities themselves of improved water supplies and household latrines;

(c) The proper utilization of water and latrines, including washing of hands after defecation and before preparation of food;

(d) The removal of spilled water from the immediate vicinity of wells, hand-pumps and public standpipes, using such spilled water for crops whenever possible; and

(e) The proper disposal of storm water, domestic waste water (sullage) and solid waste.

91. To support the provision of safe and adequate community water supplies and sanitation, governments should:

(a) Encourage the posting of professional staff to priority areas and provide training for them in appropriate technology, management and social factors (such as the participation of local communities, especially women);

(b) Provide, by adequate financial support, by recruitment and by training, a sufficient number of technicians to advise local communities and to carry out tasks which cannot be carried out by unskilled labour;

(c) Provide training in construction, operation and maintenance for men and particularly women in communities;

(d) Encourage the commercial manufacture, distribution and sale of material, components and equipment which communities or householders could not provide themselves and plan the distribution of such materials, components and equipment provided by government, international, bilateral and voluntary agencies to priority areas; and

(e) Strengthen the management functions of national and local institutions involved in water supply and sanitation (or create new

institutions where none existed), giving particular attention to the financing of such institutions by the imposition of cost-related charges for piped water supplies and by other means.

92. Governments should provide or enhance facilities, including appropriate equipment and trained personnel, for sampling and analysis as follows:

(a) On-site testing of water used or intended for small community supplies in order to determine its microbiological, chemical and physical suitability for drinking;

(b) Routine testing of discharges from industry, agriculture and other sources of pollution to surface and ground water; and

(c) Regular and continuous monitoring of major rivers and sources of water supplies to large communities in respect of all parameters affecting the quality of water, and the collating of such data and their dissemination to all departments and organizations for whom they were or might be relevant.

93. Governments should make strenuous efforts for the protection of the environment by:

(a) Strengthening existing legislation (or formulating appropriate new legislation where none existed or where existing legislation was inadequate) for the control of pollution generally, and in particular for the control of pesticides and other toxic substances whose use was not permitted in their country of origin;

(b) Enforcing relevant laws, regulations and orders;

(c) Carefully considering the health and environmental effects of all proposed development schemes (environmental impact assessment), and particularly considering whether smaller or large-scale schemes were likely to be more appropriate with regard to benefits and social, environmental and health disbenefits;

(d) Encouraging the utilization of vegetable and animal wastes to sustain the fertility of agricultural and horticultural soils and as sources of energy, taking appropriate precautions to minimize the transmission of pathogenic organisms; and

(e) Encouraging good management of irrigation works and the reuse of treated waste water for agriculture and arboriculture.

Future regional co-operation activities (agenda item 9)

94. A representative of the ECA secretariat, in introducing the short discussion paper prepared for this item, discussed some issues concerning regional co-operation between countries in the areas of shared water resources development; assessment of water resources; education; training and research; information exchange; and the environment.

95. Regional co-operation between United Nations bodies was also discussed, including the establishment of a mechanism for co-ordinating and harmonizing activities at regional level and the possibility of mounting multi-agency, multi-disciplinary teams for advisory services to member States.

96. Finally, the question of the establishment of an intergovernmental committee on water for the African region was discussed. It was suggested that pending the formation of such a committee, a regional meeting such as the present meeting could provide a mechanism for co-operation between member States and between international bodies.

97. The meeting noted that African member States were very conscious of the need to combine their efforts in strengthening regional co-operation and made the following recommendations:

(a) National governments should reinforce and, where necessary, reorganize their water resources institutions since the effectiveness of subregional or regional institutions was closely linked to the strength of the national infrastructures;

(b) A study should be undertaken by ECA, in collaboration with other United Nations organizations and agencies and other relevant intergovernmental organizations, to review the present and proposed regional co-operative arrangements, with a view to proposing the most feasible and practical means of enhancing co-operation in the field of water resources;

(c) The present regional meeting should be held every two years;

(d) Countries sharing common water resources should endeavour to strengthen co-operation in the field of water resources development, and concerned United Nations and other international bodies should be urged to assist in such undertakings when requested by co-operating countries;

(e) The Economic Commission for Africa should investigate the possibility of publishing more technical information on water resources development to enhance information exchange between countries and organizations;

(f) Because of the foreign exchange difficulties faced by African water resources personnel in purchasing publications from overseas, the United Nations system was requested to investigate ways and means of enabling the purchase of such professional publications in local currency;

(g) To the extent that the implementation of Africa's Priority Programme for Economic Recovery, 1986-1990 (APPER) would result in an increased flow of domestic and external resources, it was recommended that the Steering Committee for Co-operative Action for the International Drinking Water Supply and Sanitation Decade (IDWSSD) review the quality and quantity of support to activities to ensure a further impetus to accelerating progress in achieving the goals and objectives of the Decade in Africa;

(h) ECA, in co-operation with UNESCO and other organizations concerned, should investigate the possibility of conducting a survey of national educational and training institutions in the region dealing with the field of water resources. Such a survey should also consider the use of suitable national institutions as regional or subregional training centres;

(i) Member States were kindly requested to support and implement the establishment of a network or centre for water resources studies, research and development for Africa, as proposed by UNESCO and by the African Environmental Conference held in Cairo from 16 to 18 December 1985.